

APPENDIX E

REASONABLE WORST CASE ANALYSIS INJURY TO GROUND WATER

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1.0 INTRODUCTION

Ground water is an important natural resource to the state of Texas. Protection of ground water for human use and for its value to the environment is a high priority for Trustees. Ground water can provide services to both humans (for drinking and agriculture, for example) and to the environment (as it discharges to the surface or to surface waters).

Injury to ground water may be examined based upon the physical state of the resource, and from extractive values associated with consumptive uses, and in situ values associated with the water remaining in the aquifer. The trustees examined the groundwater extractive uses such as municipal, agricultural and industrial, and looked at the in situ services provided including ecological (freshwater input into Lavaca Bay), avoidance of subsidence, existence and bequest values.

The ground water under the Site is generally classified into several zones: Y, A, B, and C. Zone Y is the water bearing material that has been used as fill at the Site. Zones A and B are shallow sand-rich zones separated by clay deposits. Zone C, a deeper sand-rich zone, is separated from Zones A and B by additional clay deposits. Additional information on the hydrogeology of the Site can be found in the Final Remedial Investigation (RI) Report (Alcoa, 1999). The Trustees evaluated potential losses of ground water services both to humans and the environment in a Reasonable Worst Case (RWC) approach using information gathered during the remedial investigations.

2.0 EVALUATION OF INJURY

2.1 Loss of Human Use Services

For losses of ground water services to humans, the Trustees considered two factors:

- (1) Whether the concentration of mercury or other hazardous substances in these ground water zones exceed the maximum contaminant levels (MCLs) for drinking water
- (2) Whether zones with hazardous substance concentration exceeding MCLs were of sufficient quality, but for the hazardous substance contamination from the Site, to be utilized for human uses such as potable water supplies, agricultural or industrial uses.

Ground water investigations performed as part of the remedial investigations found Zones A and B to be contaminated with mercury at concentrations exceeding the MCL. However, high dissolved solids content in much of the ground water in these zones limits its use for drinking water. The deeper Zone C was sampled as part of the

remedial investigation and no evidence of mercury contamination was found.

Although water from Zones A and B may have other uses, e.g., agricultural or industrial uses, any potential losses of these ground water services are confined to the Site and are not as such public resources. For that reason, on the facility, there can be no existence or bequest values that do not belong to ALCOA. Therefore, there has been no public loss of ground water services due to contamination of ground water at this Site that merits compensation or requires further assessment.

2.1 Loss of Ecological Services

Contaminated ground water discharge from Zone B in the Chlor-Alkali Processing Area (CAPA) at PCO has been identified in the RI as a continuing source of mercury to Lavaca Bay. In May 1998, hydraulic control measures were instituted to eliminate the discharge of this mercury-contaminated ground water to the bay as part of the remedy for the Site. The hydraulic controls reduce overall ground water inflow rates to Lavaca Bay near the CAPA.

In Lavaca Bay, natural seasonal and inter-annual variations in salinity range from freshwater, 0 practical salinity units (PSU) to that of full strength seawater (35 PSU). For evaluation of potential ecological service losses, the Trustees considered the effect of remedial actions that would limit ground water flow into Lavaca Bay, thereby potentially affecting the normal range of salinity in the bay.

An upper bound estimate (i.e., RWC) of the reduction in ground water inflow was calculated to be approximately 3.8 gallons per minute. This value represents approximately 0.003 percent of the pre-remediation combined river and ground water inflow rates to Lavaca Bay. Thus, cutting off the inflow from the portion of Zone B underlying CAPA results in less than a 0.003% change in salinity (approximately 0.0002 - 0.001 PSU). Such a small change in the salinity is not expected to have ecologically relevant effects in the Lavaca Bay system.

Therefore, the Trustees have determined that, given the specific site circumstances, there are minimal compensable service losses due to reduction of ground water discharge to the bay. The restoration associated with benthic injuries, finfish, birds will offset this minimal reduction in service flows.

3.0 OTHER ISSUES

The groundwater served as a continuing release of Hg and an ongoing contaminant pathway until 1998. The Trustees have considered injuries to other natural resources resulting from contamination contributed to the bay via the ground water pathway. Injuries resulting from the introduction of mercury or other contaminants via ground water to resources in the Lavaca Bay system are captured in the Trustees' analysis when the individual resources are evaluated for injury. Thus, the contribution of contaminated ground water to other injuries is accounted for in the RWC analyses of Benthos, Fish and Bird injuries.

4.0 REFERENCES

Alcoa, 1999, Final Remedial Investigation Report, prepared for Alcoa Alumina & Chemicals, L.L.C., November 1999.